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Ref. # 10CFR50.73(a)(2)(iv)(A)

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September 12, 2001

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

**SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)**  
**DOCKET NO. 50-446**  
**ACTUATION OF REACTOR PROTECTION SYSTEM**  
**LICENSEE EVENT REPORT 446/01-001-00**

Enclosed is Licensee Event Report (LER) 01-001-00 for Comanche Peak Steam Electric Station Unit 2, "Reactor Trip Due to Spurious Turbine Trip Signal Originating From AMSAC."

IE22

TXX-01134  
Page 2 of 3

This communication contains the following new commitments which will be completed as noted:

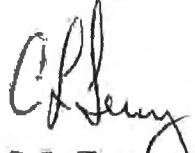
<u>Commitment Number</u>	<u>Commitment</u>
27248	Although TXU Electric believes that the problem with the Unit 2 Train A AMSAC AC power light socket was isolated, the light sockets in the Unit 1 AMSAC panel will be inspected to ensure the center contactors are intact.
<u>Commitment Number</u>	<u>Commitment</u>
27249	The power light circuits in the Unit 1 and Unit 2 AMSAC panels will be modified to prevent future similar spurious relay actuations.
<u>Commitment Number</u>	<u>Commitment</u>
27251	The need for a bulb list for use by Operations will be evaluated. This list would be used to approve or cause an evaluation of certain indicating light bulb replacements while the plant is at power.

TXX-01134

Page 3 of 3

The Commitment number is used by TXU Electric for the internal tracking of CPSES commitments.

Sincerely,

  
C. L. Terry

GLM/glm  
Enclosure

cc: Mr. E. W. Merschhoff, Region IV  
Mr. J. A. Clark, Region IV  
Resident Inspectors, CPSES

NRC FORM 366 (1-2001)			U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001			
LICENSEE EVENT REPORT (LER)						Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.			
Facility Name (1) <b>COMANCHE PEAK STEAM ELECTRIC STATION UNIT 2</b>						Docket Number (2) <b>05000446</b>		Page (3) <b>1 OF 6</b>	
Title (4) <b>REACTOR TRIP DUE TO SPURIOUS TURBINE TRIP SIGNAL ORIGINATING FROM AMSAC</b>									
Event Date (5)			LER Number (6)			Report Date (7)			Other Facilities Involved (8)
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Name
07	18	01	01	001	00	09	17	01	<b>CPSSES UNIT 1</b>
									Docket Numbers <b>05000445</b>
Operating Mode (9) <b>1</b>									This report is submitted pursuant to the requirements of 10 CFR : (Check all that apply) (11)
Power Level (10) <b>100</b>		20.2201(b)			20.2203(a)(3)(i)			50.73(a)(2)(i)(C)	50.73(a)(2)(vii)
		20.2201(d)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(A)
		20.2203(a)(1)			20.2203(a)(4)			50.73(a)(2)(ii)(B)	50.73(a)(2)(viii)(B)
		20.2203(a)(2)(i)			50.36(c)(2)(i)(A)			50.73(a)(2)(iii)	50.73(a)(2)(ix)(A)
		20.2203(a)(2)(ii)			50.36(c)(1)(ii)(A)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	50.72(a)(2)(x)
		20.2203(a)(2)(iii)			50.36(c)(2)			50.73(a)(2)(v)(A)	73.71(a)(4)
		20.2203(a)(2)(iv)			50.46(a)(3)(ii)			50.73(a)(2)(v)(B)	73.71(a)(5)
		20.2203(a)(2)(v)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(C)	OTHER
20.2203(a)(2)(vi)			50.73(a)(2)(i)(B)			50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A		
Licensee Contact For This LER (12)									
Name <b>Ben Mays, SmartTeam 1 Systems Manager</b>						Telephone Number (Include Area Code) <b>254 897-6816</b>			
Complete One Line For Each Component Failure Described in This Report (13)									
Cause	System	Component	Manufacturer	Reportable To EPIX		Cause	System	Component	
				N					
Supplemental Report Expected (14)						EXPECTED SUBMISSION DATE (15)			
YES (If YES, complete EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/> NO		Month    Day    Year			
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)									
<p>On July 18, 2001, Comanche Peak Steam Electric Station Unit 2 was in Mode 1, Power Operation, operating at 100 percent power. At approximately 7:59 a.m., during performance of a Steam Generator 2-01 Narrow Range Level 519 Channel Operability Test, a test trouble alarm was received on the Anticipated Transient Without Scram (ATWS) Mitigation System Actuation Circuitry (AMSAC) panel. During restoration of AMSAC to clear the trouble alarm, a spurious AMSAC signal was generated causing an automatic turbine trip which resulted in an automatic reactor trip from 100 percent power. All control rods fully inserted. Auxiliary Feedwater (AFW) automatically actuated following the reactor trip and the Main Steam Isolation Valves (MSIV's) were manually closed for temperature control. The plant was stabilized in Mode 3 and all systems functioned as designed.</p> <p>TXU Electric believes that the event was caused by a short circuit in a light bulb socket during replacement of an apparently burned out AC power lamp in the AMSAC panel. Corrective actions include replacement of the defective light socket, inspection of other AMSAC light sockets, and modification of the AMSAC power light circuit.</p> <p>All times in this report are approximate and Central Standard Time unless noted otherwise.</p>									

**LICENSEE EVENT REPORT (LER)**

Facility Name (1)	Docket	LER Number (6)			Page(3)
COMANCHE PEAK STEAM ELECTRIC STATION UNIT 2	05000446	Year	Sequential Number	Revision Number	2 OF 6
		01	001	00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**I. DESCRIPTION OF REPORTABLE EVENT****A. REPORTABLE EVENT CLASSIFICATION**

Any event or condition that resulted in manual or automatic actuation of the Reactor Protection System (RPS) including reactor trip or reactor scram.

**B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT**

On July 18, 2001, Comanche Peak Steam Electric Station (CPSES) Unit 2 was in Mode 1, Power Operation, operating at 100 percent power.

**C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT**

Not Applicable – There were no structures, systems, or components that were inoperable at the start of the event which contributed to this event.

**D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES**

On July 18, 2001, at approximately 7:00 a.m., Instrumentation and Controls (I&C) Personnel (Utility, Non-Licensed) were performing a Steam Generator (EIIS: (SB)) 2-01 Narrow Range Level 519 Channel Operability Test. During the test, a trouble alarm was generated on the Unit 2 AMSAC panel (EIIS: (JL)). AMSAC provides a backup to the Reactor Trip System (RTS) (EIIS: (JC)) and ESF Actuation System (ESFAS) (EIIS: (JE)) for initiating turbine trip and auxiliary feedwater flow in the event an anticipated transient results (e.g., the complete loss of main feedwater). The test procedure directed the I&C personnel to reset the alarm following completion of the test. While responding to the AMSAC trouble alarm, Operations personnel (Utility, Licensed) noticed that the Train A power light was not illuminated. At approximately 7:52 a.m., Operations personnel (Utility, Licensed) took AMSAC from normal to bypass and the bypass alarm was received as expected. While AMSAC remained in bypass, the I&C personnel (Utility, Non-Licensed) replaced the Train A power light. At 7:59 a.m., Operations personnel (Utility, Licensed) placed AMSAC back in the normal position. When the switch was placed in normal, a spurious AMSAC Train A actuation signal was generated that caused an automatic turbine trip and resulted in an automatic reactor trip from 100 percent power. All control rods (EIIS: (AA)) fully inserted. The reactor trip was followed by an automatic Auxiliary Feedwater (AFW) (EIIS: (BA)) actuation. During the reactor trip, two

**LICENSEE EVENT REPORT (LER)**

Facility Name (1)	Docket	LER Number (6)			Page(3)
COMANCHE PEAK STEAM ELECTRIC STATION UNIT 2	05000446	Year	Sequential Number	Revision Number	3 OF 6
		01	001	00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

Feedwater Heater (EHS: (SJ)) relief valves lifted and released steam into the Unit 2 Turbine Building (EHS: (NM)). At 8:06 a.m., Operators (Utility, Licensed) in the Unit 2 Control Room were notified of the steam release and they closed the Main Steam (EHS: (SB)) Isolation Valves (MSIV's) to isolate the steam leak. This action required the use of the Steam Generator (SG) Atmospheric Relief Valves (ARVs) to maintain temperature control of the Unit 2 Reactor. This resulted in a normal steam release to the atmosphere. Secondary activity levels were verified by procedure to be acceptable. The plant was stabilized in Mode 3 and all systems functioned as designed.

**E. THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE, OR PROCEDURAL OR PERSONNEL ERROR**

Operators (Utility, Licensed) in the Unit 2 Control Room received a reactor trip greater than 50 percent power turbine trip alarm.

**II. COMPONENT OR SYSTEM FAILURES**

**A. FAILURE MODE, MECHANISM, AND EFFECTS OF EACH FAILED COMPONENT**

Since the AMSAC Train A relay coil power light bulb was initially not illuminated but was later demonstrated functional, a failed light socket is suspected. The spurious AMSAC Train A actuation was believed to have occurred when the bulb contactor on the center barrel of the socket separated from the current limiting resistor, and fell into a position that caused a short between the center post and the side of the light socket. When a new bulb was installed in the socket on July 18, 2001, the contact short was reinforced. The increase in current due to the loss of resistance of the bulb and the socket's current limiting resistor was enough to energize the AMSAC relays.

The design of the AC power lamp in the energized relay circuit did not prohibit a single point failure of the light socket from energizing the AMSAC relays. Review of the relay circuit design indicates that the AC power lamp is in series with the AMSAC relays. The design relies on the resistor built into the light socket to limit current through the circuit. When the light socket fails in a short circuit, the current to the relays is no longer limited and an AMSAC actuation will occur.

**LICENSEE EVENT REPORT (LER)**

Facility Name (1)	Docket	LER Number (6)			Page(3)
		Year	Sequential Number	Revision Number	
COMANCHE PEAK STEAM ELECTRIC STATION UNIT 2	05000446	01	001	00	4 OF 6

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**B. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE**

The wire that connects the current limiting resistor to the bulb contactor on the center barrel of the socket was found to be broken. Evidence of tinning was found in the cross section of this wire, and TXU Electric believes that this indicates a discontinuity existed in the wire at the time the socket was manufactured. A break in the wire allowed the contactor to fall out of it's barrel location. Based on the lack of any evidence of mishandling of the socket, TXU Electric believes that CPSES maintenance practices did not cause or contribute to the broken wire.

**C. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE OF COMPONENTS WITH MULTIPLE FUNCTIONS**

Not applicable – No failures of components with multiple functions have been identified.

**D. FAILED COMPONENT INFORMATION**

Dialight Corp.  
Model Number 137-8836-0931-552  
Light Bulb Socket

**III. ANALYSIS OF THE EVENT****A. SAFETY SYSTEM RESPONSES THAT OCCURRED**

The Reactor Protection System (EIS:(JC)) and The Auxiliary Feedwater System (EIS:(BA)) actuated during the event.

The Motor Driven Auxiliary Feedwater (MDAFW) pump (EIS: (P)(BA)) number 1 and the Turbine Driven Auxiliary Feedwater (TDAFW) pump (EIS: (P)(BA)) automatically started without Steam Generator Lo-Lo water level (EIS: (JB)) signals. This is the expected response during an AMSAC actuation. Motor Driven Auxiliary Feedwater (MDAFW) pump (EIS: (P)(BA)) number 2 automatically started on a Lo-Lo water level signal in Steam Generator number 3.

**LICENSEE EVENT REPORT (LER)**

Facility Name (1)	Docket	LER Number (6)			Page(3)
COMANCHE PEAK STEAM ELECTRIC STATION UNIT 2	05000446	Year	Sequential Number	Revision Number	5 OF 6
		01	001	00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY**

Not Applicable – No safety system trains were inoperable during this event.

**C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT**

This event is bounded by the FSAR accident analysis which assumes conservative initial conditions which bound the plant operating range and other assumptions which reduce the capability of safety systems to mitigate the consequences of the transient.

This event is bounded by the analysis of the turbine trip presented in Section 15.2.3 of the CPSES Final Safety Analysis Report (FSAR). The analysis uses conservative assumptions to demonstrate the capability of pressure relieving devices and to demonstrate core protection margins. The event of July 18, 2001, occurred at 100 percent reactor power, and all systems and components functioned as designed.

After the reactor trip and during the stabilization of the plant, a Main Steam Isolation was manually initiated due to a report of steam in the Turbine Building, and the Steam Generator Atmospheric Relief Valves were used for temperature control. Both Main Feedwater Pumps tripped, and Feedwater flow was adequately maintained by the Auxiliary Feedwater System. Secondary activity levels were verified by procedure to be acceptable.

There were no safety system functional failures associated with this event.

Based on the above, it is concluded that the event of July 18, 2001, did not adversely affect the safe operation of CPSES Unit 2 or the health and safety of the public.

**IV. CAUSE OF THE EVENT**

TXU Electric believes that the event was caused by a short circuit in a light bulb socket during replacement of an apparently burned out AC power lamp in the AMSAC panel. The short circuit caused a spurious AMSAC Train A actuation that resulted in a turbine trip and automatic reactor trip. The design of the AC power lamp in the energized relay circuit did not prohibit a single point failure of the light socket from energizing the AMSAC relays. TXU Electric believes that the failed light socket may have been degraded since manufacture.



**LICENSEE EVENT REPORT (LER)**

Facility Name (1)	Docket	LER Number (6)			Page(3)
COMANCHE PEAK STEAM ELECTRIC STATION UNIT 2	05000446	Year	Sequential Number	Revision Number	6 OF 6
		01	001	00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**V. CORRECTIVE ACTIONS**

The Unit 2 Train A AMSAC AC power light bulb and socket have been replaced and verified functional. The other Unit 2 AMSAC panel light sockets were inspected and no discrepancies were found. Although TXU Electric believes that the problem with the Unit 2 Train A AMSAC AC power light socket was isolated, the light sockets in the Unit 1 AMSAC panel will be inspected to ensure the center contactors are intact. The power light circuits in the Unit 1 and Unit 2 AMSAC panels will be modified to prevent future similar spurious relay actuations. The need for a bulb list for use by Operations will be evaluated. This list would be used to approve or cause an evaluation of certain indicating light bulb replacements while the plant is at power.

**VI. PREVIOUS SIMILAR EVENTS**

There have been other previous events which resulted in a turbine trip followed by an automatic reactor trip. However, the causes of those events were sufficiently different such that the corrective actions taken for the previous events would not have prevented this event.